

Math 5863

TF Problem Set # 3

due Wednesday, February 6.

Instructions: Determine whether each statement is true or false and be prepared to orally provide a brief proof or counterexample supporting your conclusion. This is a group assignment in which you must consult with classmates, comparing answers before the due date!

PROBLEM 1. The French railway metric on \mathbb{R}^2 is locally compact.

PROBLEM 2. Let X be the space obtained by identifying together each pair of opposite edges of a (filled-in) regular octagon in \mathbb{R}^2 (using the same orientation on the opposite edges). Then X is homeomorphic to the torus T^2 .

PROBLEM 3. Contractible spaces are connected.

PROBLEM 4. The Euler characteristic of the Mobius band M^2 is 0.

PROBLEM 5. There is a "capital letter subspace"¹ of R^2 that has Euler characterisic 2.

PROBLEM 6. Contractible spaces are locally connected.

PROBLEM 7. Every continuous function from a space X to a contractible space Y is nullhomotopic. (A map is *nullhomotopic* iff it is homotopic to a constant function.)

¹ala Chapter 0 of Hatcher's book